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ABSTRACT

Evaluation data from Title I compensatory education projects under the Hawaii State Department of Education were collected to examine the effects of different instructional settings and approaches on the achievement of Title I students who received remedial reading and mathematics instruction from 1978 to 1981. Based on the descriptive statistics, project profiles were developed, indicating enrollments, hours of instruction, costs, student achievement gains, and other characteristics of the different Title I projects within the State. It was found that in general, for the three school years considered: (1) students in lower grades made greater Normal Curve Equivalent (NCE) score gains than those in higher grades; (2) smaller school and project sizes were associated with greater NCE gains; (3) students with lower pretest scores made greater gains than those with higher pretest scores; (4) higher per pupil costs were associated with greater NCE gains; (5) absenteeism was inversely related to achievement gains; (6) the pull-out setting had a more favorable impact on achievement than other instructional settings; and (7) combined instructional approaches (e.g., a prescribed system supplemented by teacher-made materials) produced greater gains than an approach that used commercially packaged materials with a prescribed instructional system, or one that used both commercially-packaged and teacher-made materials without a prescribed instructional system. (MJL)

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Effects of Instructional Setting and Approach in Compensatory Education: A Statewide Analysis

Abstract

The present study grew out of an increased awareness of information needs in making curricular decisions at the school level. Data were coded from evaluation reports for some 300 Chapter 1 projects over a three-year period. Among other things, different project settings and instructional approaches were examined in the study. Results suggest a discernible trend favoring the pull-out setting. While there was some interaction between project setting and grade level, such effects were generally negligible. Overall, an eclectic instructional approach (e.g., a prescribed system supplemented by teacher-made materials) was as effective as, if not more so than, other approaches. Some interaction was found between instructional approach and grade level.

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INTRODUCTION

Chapter 1 represents one of the largest federal investments in education for disadvantaged youth in the nation. Typically, Chapter 1 projects provide remedial instructional services in basic skills areas such as reading and mathematics. In a majority of the projects, the services were provided in a pull-out setting (Stonehill and Anderson, 1982). Instructional approaches used in these projects are often described as "eclectic" involving the use of teacher-made as well as commercially packaged materials. The adoption or adaptation of instructional settings and approaches is often a matter of logistical convenience or fiscal necessity rather than an outcome of careful deliberations of benefits and impact. While there has been little direct evidence to indicated the efficacy, or the lack of it, of the pull-out setting, negative perceptions have been expressed by some researchers. Harnischfeger (1980), for example, described two major shortcomings of the pull-out setting. First, the pull-out teachers have little contact with the classroom teachers. As a result, there is little integration of the pull-out with the classroom instruction and the classroom teacher loses close contact with the progress of students who are pulled-out. Secondly, if students receive reading instruction in a pull-out program, usually they are pulled-out of classroom reading instruction. Consequently, pull-out students do not receive extra learning opportunity and often receive less reading time than the rest of the class due to increased transition time.

It may be hypothesized, on the other hand, that since the pull-out

setting often means smaller class size and generally provides greater instructional support to students, it could be expected to produce greater achievement (Tobias, 1982). Smith and Glass (1980) for instance, found that reducing class size had benefical effects both on cognitive and affective outcomes and on the teaching process itself.

It has been reported that major programs in compensatory education that appear different do not seem to have differential impact upon the participants. In a review of effects of different curricula in early childhood eudcation, Weikart (1981) found that the expected major differences between curricula simply were not obtained. The author suggested that the basic issues in successful programming had to do with the quality of program implementation rather than the philosophy of curriculum selected.

In much the same vein, Tobias (1982) argued that external differences between instructional treatments, whether they are educational media, methods of organizing classroom, or technological devices, are important only in terms of the degree to which they influence the student's cognitive activities while engaged by the instructional content. External differences in instructional arrangements that lead to similar cognitive processing will result in comparable achievement irrespective of superficial difference between methods. The author suggested that, generally, any instructional method or procedure which induced students to spend more time on task than a comparison mode would result in higher achivevement.

Tobias (1976, 1981) hypothesized that students with low prior achievement required a good deal of instructional support to accomplish

objectives. Conversely, those higher in prior achievement needed little support. Prior achievement was defined by students' pretest scores. Instructional support was defined as the assistance given the learner in organizing the instructional content, maintaining student attention, eliciting responses, providing feedback on the response, and so on.

Results from empirical work on the impact of instructional settings on student achievement in compensatory education have been equivocal or ambiguous. In the Instructional Dimensions Study (IDS), Cooley and Leinhardt (1980) found that pull-out instruction was related inversely with reading achievement. However, in a reanalysis of the same data involving only pull-out students a positive relationship was evident between pull-out and posttest achievement in reading (Leinhardt and Pallay, 1982). Incidentally, teachers involved in the IDS project expressed mixed opinions about the pull-out setting. Pull-out was said to be negative because it was a managerial headache, demoralized the children, and disrupted the day. It was said to be positive because more intensive remediation could be given to children who needed it. In an evaluation of the Emergency Schoold Aid Act, Coulson et al. (1977) found evidence suggesting that pull-out was associated with lower achievement. The authors reported that a change from receiving no pull-out instruction in reading to receiving one half reading instruction in pull-out was associated with a reduction in reading achievement. Although the effect was small, the finding does not support the notion that pull-out is a positive practice.

Leinhardt and Pallay (1982) reported empirical work that demonstrated success, failure, and no difference in a variety of instructional

settings. The authors concluded that setting was not a clearly overwhelming variable in and of itself. However, it was worth investigating and speculating how setting influenced features of instruction that in turn influenced student learning time.

Findings of no significant differences between the pull-out and regular classroom setting are consistant with Dahllof's (1971) assertion that achievement cannot be regarded as a direct outcome of the grouping arrangement. As Leinhardt and Pallay (1982) pointed out, setting does not eliminate or guarantee the presence of effective instructional practices. Most of the important variables can occur in most settings.

THE STUDY

The Hawaii Department of Education has systematically gathered Title 1 data since the inception of evaluation requirements in the Title 1 legislation more than a decade ago. Little, however, was done to integrate the data either on a longitudinal or cross-sectional basis to address questions relating to statewide program activities. It was a widely shared perception within the Department that evaluation data gathered during the past several years had not been put to maximum use. There was a need to find out what types of data had been collected and how such data could be used to address subtantive issues relating to Hawaii's overall Title 1 effort. The study grew out of an increased awareness of information needs in making curricular decisions at the school level (David, 1981; Alkin, et al., 1982). It was conceived jointly by an external researcher and

internal project staff and took the form of a secondary analysis (Burstein, 1978) of evaluation data gathered over a period of three years. The study addressed the following research questions:

1. What are the effects of different instructional settings on the achievement of students participating in Chapter 1 projects?
2. What are the effects of different instructional approaches on the achievement of students participating in Chapter 1 projects?

The primary audience of the project was to be the Hawaii state office personnel (e.g., evaluation and compensatory education staff). It became clear, however, that district coordinators and Title 1 school administrators as well as the teaching staff could also benefit form the project. Plans were then made to disseminate the results to a much larger audience than the state office staff.

No experimental manipulation was used in the study. Data were coded from evaluation reports for some 300 Chapter 1 projects over a three-year period. Among other things, three project settings and three instructional approaches were examined in the study:

I. Project Setting

A. Pull-out. This involved the pulling out of participating students from the regular classroom to receive remedial instructional services from the Chapter 1 teacher or teacher aide in a small group setting.

Note: Federal legislation changed Title 1 to Chapter 1 in 1981.

B. Regular classroom. The setting required the Chapter 1 teacher or aide to intervene directly in the regular classroom. The teacher or aide worked with project students while instruction was being provided to non-project students by the regular classroom teacher at the same time.

C. Combination. This involved the provision of instructional services in a combination of pull-out and regular classroom settings.

II. Instructional Approach

A. Instructional system. This consisted of the use of a prescribed system with a set of commercially packaged materials along with protocols for their use.

B. Materials only. This approach allowed the Chapter 1 teacher or aide to use materials, both commercially packaged and teacher-made, in ways she/he saw fit without having to follow prescribed protocols.

C. Combination. This consisted of the adaptation of a prescribed instructional system along with associated materials and the use of a miscellany of other materials, commercial or teacher-made, to supplement the prescribed system.

PROCEDURE

The investigation was carried out in cooperation with the state evaluation and compensatory education staff. The involvement of compensatory education staff was particularly crucial with respect to

formulating and prioritizing questions to be addressed. The scope of the study depended in a large measure on feedback provided by the compensatory education staff.

Design

The study was conceptualized in early 1981 when data use became an area of interest to both state and local district staff in Hawaii. The state evaluation staff, in particular, perceived a need to build a data base by pooling data presented in evaluation reports for past school years and to use the data base to address statewide issues relating to Chapter 1. Several discussions were held during the early months of 1981 which resulted in the delineation of the following design elements:

1. Data sources would be limited to evaluation reports prepared by the external evaluator and related documents (e.g., state directories and welfare reports).
2. The study would cover data for the 1978-81 school years.
3. Schools would be used as the unit of analysis. Data were to be aggregated across grades for each school. (This decision was later relaxed to accommodate grade-by-grade analysis of achievement data.)

A preliminary list of variables of interest was compiled by the state evaluation staff on the basis of a review of several school-level evaluation reports. The list was reviewed by the author and subsequently served as a basis for the development of a coding format.

State evaluation and compensatory education staff were involved in formulating and prioritizing research questions for the study. Following

several discussions, it was decided that while all variables identified were of interest to the staff, the study would focus on questions relating to the effects of various instructional approaches and project setting on student achievement.

Data Coding

Data coding was acomplished in three phases. Preliminary coding of project and school information was conducted by research assistants at the laboratory in Portland. These data pertained essentially to information obtainable from the district-level reports. Such information items included school code, school enrollment, school type, grade levels covered by school, welfare status of attendance areas and overall student achievement.

The second phase of data coding was conducted on-site in Hawaii with the aid of graduate students hired by the compensatory education section. The coding covered some 300 plus school-level evaluation reports and included information obtainable only from the school-level reports. Such information included student grouping, diagnostic testing, inservice training, project setting and instructional approach. With respect to the coding of instructional approaches a list of basal materials used in Chapter 1 projects was prepared by the compensatory education staff. The list was reviewed by language arts specialists at the state department of education. Based on this review, the three primary categories of instructional approaches mentioned earlier were established.

The third phase of data coding included grade-by-grade achievement data within each project. This was done following considerable discussion on

comparability of NCE gains across grades, resource constraints and the merits of having a grade-by-grade analysis of achievement data. The coding was accomplished by student helpers at the evaluation section.

As would be expected, a number of problems were encountered in coding information from the evaluation reports, including:

1. Missing data. Information was not provided in the district or school-level reports. For example, there were no data on staff FTE and absenteeism for the 1978-79 school year. No information on project setting and instructional approach was obtained for secondary projects for the 1978-79 and 1979-80 school years.
2. Ambiguous narratives. Some project narratives in the school-level reports were difficult to interpret. For example, in some cases membership of parent advisory councils was not clearly described.
3. Lack of discreteness. Many projects used composite project settings and student groupings. For instance, some narratives mentioned use of individual, small group and large group instruction with various grouping configurations.

Most problems were resolved on the basis of the data coders' best judgment. In other cases, the data sheets were left blank.

Data Analysis

Completed data sheets were mailed to the author at the Laboratory in Portland. These were key-punched and quality control measures were taken to ensure accuracy of coding and validity of the coded data. A few cases were discarded because of excessive missing data and some inaccuracies in coding were corrected. Data analyses were then performed on the "clean" data.

Initially, means and standard deviations were computed for all variables of interest. These calculations were conducted separately for each of the three school years included in the study. Descriptive statistics were obtained on the selected variables by subject area (i.e., reading versus mathematics) and by school type (i.e., public versus private). Due to the relatively small number of projects in private schools, subsequent analyses were confined to projects in public schools. (See Table 1 for list of selected variables.)

Table 1 about here

Correlational analyses were then performed on samples of public school reading projects, again separately for each of the three school years. These analyses were conducted to identify factors which were related to student achievement.

A third set of analyses consisted of analyses of covariance (ANCOVA's) of project NCE gains using per pupil cost and pretest NCE as covariates, the latter variables having been shown to be related to student achievement. The ANCOVA's were performed to assess the effects of project settings and instructional approaches commonly used in Chapter 1 projects in Hawaii. Again, these analyses were performed separately for each of the three school years. The ANCOVA's were first performed on NCE gains for projects as a whole--grade level gains having been agregated across grades. Similar analyses were then conducted separately for each grade.

RESULTS

Project Profile

Based on descriptive statistics provided in the analyses, project profiles were developed for Chapter 1 projects included in the study. The data indicate that the average Chapter 1 reading project enrolled 98-127 students in five different grades and provided 96-99 hours of instruction. The project employed 3.4-4.9 FTE staff and produced an achievement gain of 7-8 NCEs at a per pupil cost of $672-$712. The average math project enrolled 50-67 students in five different grades and provided 61-75 hours of instruction. The project employed 3.0-7.0 FTE staff and produced an achievement gain of 11 NCEs at a per pupil cost of $458-$488.

A comparison of project profiles suggests that while reading project configurations (e.g., project enrollment, duration, hours of instruciton and costs) fluctuated somewhat over the years, project impact in terms of NCE gains has remained relatively stable, ranging from a low of 7.40 for the 1979-80 school year to a high of 8.17 for the 1980-81 school year. Pretest status has increased from 18.7 NCEs (7 percentile) for the 1978-79 school year to 22.6 (10 percentile) for the 1980-81 school year. On the other hand, increasingly less money was spent on the average student. The per pupil cost declined from $712 in 1978-79 to $673 in 1980-81.

Configurations of math projects also varied somewhat over the years. Again, project impact in terms of NCE gains has remained relatively stable. Consistent with results obtained from national studies, NCE gains in math projects were larger than those found in the reading projects. For all three school years included in the study, such gains have been

approximately 11 NCE points. Also, the pretest status of project students increased from 21.6 NCEs (9 percentile) in 1978-79 to 23.99 (11 percentile) in 1980-81.

Factors Related to Achievement

For the 1978-79 school year, ten of the variables of interest were found to be significantly ($p \leq .05$) related to student achievement. These included school type (-.30), grade levels covered by school (.25), project enrollment (-.21), size of project staff (-.20), school enrollment (-.20), number of students tested (-.23), pretest NCE scores (-.30), posttest NCE scores (.48), percent of students making positive gains (.79) and per pupil cost (.37). The correlation coefficients which ranged from low to moderately high in magnitude suggest the following:

1. Students in lower grade levels made greater NCE gains.
2. Projects with smaller enrollments tended to produce greater NCE gains.
3. Project with smaller project staff tended to produce greater NCE gains.
4. Projects which were located in smaller schools tended to produced greater gains.
5. Projects with higher funding levels tended to produce greater gains,
6. Projects with a lower pretest status tended to end up with higher NCE gains.

Taken together, the results indicate a project/school size effect. That is, projects with small enrollments located in small schools were

shown to have favorable impact on student achievement. That students at lower grades tended to make greater NCE gains and that projects with a lower pretest status tended to end up with higher NCE gains are generally consistent with national TIERS results.

For the 1979-80 school year, 11 of the variables were shown to be significantly ($p<.05$) related to student achievement. These variables were school type (-.21), grade levels covered by project (.31), inservice training on evaluation (.20), size of project staff (-.24), school enrollment (-.24), size of school staff (-.25), pretest NCE scores (-.48), posttest NCE scores (.36), percent of students making positive gains (.82), number of days absent (-.39) and per pupil cost (.22). The correlation coefficients, ranging from low to moderately high, support the following inferences:

1. Students in lower grade levels made greater NCE gains.
2. When project staff received inservice training on evaluation, project outcomes appeared to be more positive.
3. Projects located in relatively small schools tended to produced greater NCE gains.
4. Projects with lower pretest status tended to end up with greater NCE gains.
5. Absenteeism was shown to have an adverse effect on student achievement.
6. Projects with higher funding levels tended to produce greater NCE gains.

By and large, these findings represent a replication of those obtained for the preceding school year. Two additional findings are, however, noteworthy. One, when project staff received inservice training on evaluation, project outcomes appeared to be more positive. This may be due to better quality control measures being instituted (e.g., better test administration and scoring) as a result of the inservice. Two, number of days absent was found to be inversely related to NCE gains. This finding is consistent with results of recent studies conducted on time on task (Harnischfeger, 1980).

For the 1980-81 school year, nine of the variables included in the study were found to be significantly ($p<.05$) related to student achievement. These variables were school type (-.32), grade levels covered by school (.25), project enrollment (-.26), school enrollment (-.35), size of school staff (-.37), number of students tested (-.26), pretest NCE scores (-.33), posttest NCE scores (.58) and percent of students making positive gains (.37). Again, the correlation coefficients ranged from low to moderately high in magnitude and appeared to support the following interpretations:

1. Students in lower grade levels made greater NCE gains.
2. Project with smaller enrollments tended to produce greater NCE gains.
3. Projects located in smaller schools tended to produce greater NCE gains.
4. Projects with a lower pretest status tended to end up with greater NCE gains.

These findings are generally consistent with those obtained for the preceding school years--particularly so with respect to the favorable effects of small school/project size. A significant departure is the fact that per pupil cost was not shown to be related to student achievement. The absence of a relationship may, in part, be due to the way in which cost was reported for the 1980-81 school year. It is noted that the standard deviation of per pupil cost for the 1980-81 school year nearly equaled the mean and was substantially larger than the standard deviations for the preceding school years.

Taking the results for the three school years into account one readily discerns a generally consistent pattern. The pattern suggests four replicable findings. One, students in lower grade levels tended to make greater NCE gains than those in higher grades. Two, there was some evidence that smaller was better when it came to project and/or school size. There was an inverse relationship between project/school size and student achievement. Three, projects which started off with a lower pretest status generally ended up with greater NCE gains. Four, per pupil cost-- probably a surrogate for other important program elements--was a potent predictor of student achievement. There appeared to be a positive relationship between cost and NCE gain.

It should be noted that factors which have been found to be significantly related to project impact do not necessarily "explain" why students in a project made NCE gains. No causal relations should be inferred from results of the correlational analysis. The findings, nonetheless, contribute to a more meaningful interpretation of NCE gains and better understanding of the complexity of project implementation.

Effects of Project Setting

Reading. For the 1978-79 school year, a majority of the reading projects for which information was made available provided instructional services in a pull-out setting. A small number provided instruction in the regular classroom. Some projects used a combination of settings (see Table 2). Results of the analysis of covariance (with effects of pretest and cost partialled out) suggest that "pull-out" represented an effective setting for providing Chapter 1 services. Students who received instruction in this setting performed as well as, if not better than, their counterparts in other settings, although the difference did not reach statistical significance at the .05 level. Specifically, these students as a group made an NCE gain of 8.73 as compared with gains of 5.91 and 7.64 in "regular classroom" and "combination," respectively.

The superiority of the pull-out setting was also evident in the 1979-80 achievement data. Students who received instructional services in this setting made an NCE gain of 8.30. Students in "regular classroom" and "combination" made gains of 5.08 NCEs and 6.18 NCEs, respectively. (See Table 3.) The difference, after adjusting for pretest and cost, was statistically non-significant at the .05 level, however.

Projects which provided instruction in a pull-out setting during the 1980-81 school year produced an average NCE gain of 9.73. This compared favorably with gains of 6.78 NCEs and 8.64 NCEs produced by "regular classroom" projects and "combination" projects, respectively. (See Table 4.) Again, the difference did not reach statistical significance at the .05 level when effects of cost and pretest status were partialled out.

Tables 2-4 about here

Math. Math projects were combined for all three school years to yield a larger sample size for the analysis of covariance. Among projects for which information was made available, approximately one-half provided instruction in the regular classroom setting and the other half used the pull-out setting. (See Table 5.) Results showed that students in the pull-out setting made substantially greater gain (13.33 NCEs) than their counterparts in the regular classroom setting (8.36 NCEs), although the difference, after adjusting for cost and pretest status, failed to reach statistical significance at the .05 level.

Table 5 about here

Interaction between grade level and project setting. Due to small sample sizes and missing data problems, no attempt was made to ascertain interaction effects through a formal factorial analysis of covariance. Instead, actual and adjusted means were calculated for the respective settings separately for each grade level.

Results for the 1978-79 reading projects, which included data for grades two through eight, showed that the effects of project settings were pretty much "balanced" out when grade level was taken into consideration.

Specifically, the regular classroom setting was shown to be particularly effective at grades four and seven. The pull-out setting appeared superior with sixth-and eighth-graders while combination of settings was apparently most effective with students in grades two, three and five. The differences were, however, not substantial in most cases.

For the 1979-80 reading projects, the pull-out setting was shown to be superior for grades three, six and seven. A combination of "pull-out" and "regular classroom" appeared to have the most favorable impact on grades two, four, five and eight. In no case was the regular classroom setting found to be superior (statistical significance aside) to the other settings.

By far the 1980-81 results for reading projects appeared most consistent with the overall trend described earlier when grade level was not taken into account. The full-out setting was shown to be most effective in eight out of 11 instances. A combination of "pull-out" and "regular classroom" was superior in the other three instances, i.e., for grades two, three and eight. Again, in most cases, the differences appeared to be not substantial.

Results for the math projects were also generally consistent with the overall trend. In a majority (five out of seven) of instances, the pull-out setting was shown to be most effective. The regular classroom setting appeared superior with students in grades five and seven.

Summary. The overall analysis produced a clearly discernible trend indicating superiority of the pull-out setting when grade level was not taken into consideration. While there appeared to be some interaction between project setting and grade level (i.e., effects of a project setting

are somewhat dependent on the grade level in question), such effects were generally not substantial. For both reading and math projects, the overall trend seemed to favor the pull-out setting.

Effect of Instructional Approach

Reading. For the 1978-79 school year, information on instructional approaches was difficult to extract from the school or district level evaluation reports. As a result, a majority of the projects were grouped under the "others" category (see Table 6). Among projects for which information was obtained, most used a combination of instructional approaches, i.e., materials with a prescribed instructional system as well as materials without such a system. Six projects used materials with a prescribed instructional system and three used materials without a prescribed system. The results showed that a combination of approaches may well be superior to either approach. Students who received instruction in a combined approach made an average NCE gain of 10.39, comparing favorably with gains of 8.32 NCEs and 4.83 NCEs under a prescribed instructional system and under materials only, respectively.

Results for the 1979-80 school year revealed a similar trend. The combination approach was shown to be superior, producing an NCE gain of 9.37. Achievement gains for "instructional systems" and "instructional materials only" were 6.50 NCEs and 5.53 NCEs, respectively. After adjusting for pretest and per pupil cost, differences among the instructional approaches were shown to be statistically significant at the .05 level. (See Table 7.)

For the 1980-81 school year, the three approaches (i.e., instructional

systems, instructional materials only, combination) appeared to have produced highly similar achievement gains, ranging from 9.23 NCEs to 10.07 NCEs. These differences were not only statistically non-significant at the .05 level but also seemed negligible in magnitude. The trend favoring the combination approach was not evident in the 1980-81 data. (See Table 8.)

Tables 6-8 about here

Math. Eleven projects which provided mathematics instruction to participants used the combination approach. Thirteen projects used approaches which had to be classified as "others." No relevant information was obtained for the other math projects. Results of the analysis showed that the combination and the "others" approaches produced highly similar NCE gains--10.32 and 10.56, respectively. The difference was statistically non-significant and minuscule. (See Table 9.)

Table 9 about here

Interaction between grade level and instructional approach. Due to small sample sizes and missing data problems, no attempt was made to ascertain interaction effects through a formal factorial analysis of

covariance. Instead, actual and adjusted means were calculated for the respective instructional approaches in reading projects separagely for each grade level.

Results for the 1978-79 school year showed that the combination approach was superior for grades two and five. Students in grades three, four, six and eight appeared to do well with "instructional materials only." Seventh-grade youngsters who received instruction under a prescribed system appeared to perform better than their counterparts under "instructional materials only" or the combination approach.

For the 1979-80 school year, the combination approach was found to have produced the greatest NCE gains for all grade levels included in the analysis except the eighth-grade. All instructional approaches appeared to be equally effective for the eighth-graders, the differences in NCE gains being negligible in magnitude.

The superiority of the combination approach appeared less evident in the 1980-81 data. For three of the grade levels (four, five and six), this approach was shown to be more effective than other approaches. On the other hand, a prescribed instructional system seemed to work better with youngsters in grade two, seven and eight. "Instructional materials only" was shown to be most effective with third-graders.

Summary. Although the trend was not very clear, the analysis seemed to have produced some evidence favoring the combination approach. This approach was shown to have produced the greatest NCE gains for the 1978-79 and 1979-80 school years. All three approaches were found to be similarly effective for the 1980-81 school year. When grade level effects were taken

into consideration, the trend became less evident, as would be expected. Overall, however, the combination approach was shown to be as effective as, if not more so than the other approaches in helping Title 1 youngsters.

DISCUSSION AND CONCLUSIONS

Among project characteristics included in the study, previous investigations have shown class size (Glass and Smith, 1978; Glass and Smith, 1979; Smith and Glass, 1980), learning time (DeValult, et al., 1977; Fisher, et al., 1978; Harnischfeger and Wiley, 1978; Stallings, 1980; Harnischfeger, 1980), and expenditures (Polley, 1976) to be related to student achievement. Attendance rate, once socioeconomic factors were accounted for, was found not to be associated with achievement (Polley, 1976). Results of the present study generally lend support to some of the previous findings even though the latter were obtained with general student populations rather than Chapter 1 students. Project hours, for instance was not found to be related with achievement gains. It is, however, noted that findings from some of the previous studies indicated that mere length of the school day or class period does not necessarily influence student achievement. The positive relationship depends on how the available time was used, not just the amount of time available (Stallings, 1980; Karweit and Slavin, 1981).

Project enrollment correlated negatively with achievement gains. Similarly, school enrollment was found to be inversely related to achievement gains. The negative correlations appear generally consistent

with Polley's (1976) finding that larger district enrollment tended to show poorer average achievement. Contrary to Polley's results, absenteeism was found to be related to student achievement, at least for one of the three school years.

Previous findings (Glasman and Biniaminov, 1981) relating to expenditures receive support from the present study. Polley (1976) found a positive relationship between median teacher salaries and student achievement. Moreover, per pupil cost on principals' salaries was also positively related to achievement. The major share (over 80%) of Chapter 1 expenditures consists of personnel costs. The per pupil cost index used in the present study was highly similar to expenditure indices used in Polley's study. Cost indices used in the present study correlated positively with achievement gains.

Pretest achievement status and school type correlated negatively with achievement. The finding suggests that lower achieving projects tended to produce greater gains and that students in lower grades tended to make greater gains. It is noted that in other recent Chapter 1 studies (e.g., national annual Title 1 evaluation reports) similar trends were found. That is, the lower achieving students show more of a "spurt" of growth while higher achieving students show steady, but less dramatic gains. This occurs not as a result of the regression to the mean but rather as a consequence of the development process. Developmental factors may also account for the fact that students in lower grade levels tended to make greater gains.

The primary areas of interest in the present study consist of such

manipulable program features as project setting and instructional approach. Contrary to negative perceptions expressed by some researchers (Harnischfeger, 1980), the pull-out setting was shown to be superior to other project settings (e.g., regular classroom) examined in the study. Even when grade level effects were taken into account, the overall trend still appeared to favor the pull-out setting. The trend was less clear with respect to the effects of different instructional approaches. In a majority of instances, however, the combination approach was shown to have worked as well as, if not better than other approaches. The assertion of superiority for the pull-out setting and, to a lesser extent, for the combination instructional approach was made on the basis of replicability (i.e., that the same pattern of results was observed for different school years and within each school year in different grade levels) rather than on the basis of statistical significance. As many researchers (e.g., Coats, 1970; Cronbach, 1975; Carver, 1978) have pointed out, statistical significance, while important, should not be used as the sole criterion for interpreting results of educational research. Replicability is a far more useful and appropriate criterion.

The study suggests several potent variables for predicting Chapter 1 student achievement. These variables include school type, school/project enrollment, pretest achievement status, per pupil cost, absenteeism, project setting and instructional approach. Results of the study support the following conclusions:

1. Project impact as measured by NCE gains over the three school years covered by the study has remained quite stable ranging from

7 NCEs to 8 NCEs for the reading projects and hovering around 11 NCEs for the math projects.

2. Students in the lower grade levels can be expected to make greater NCE gains than students in higher grade levels. The difference is probably a result of the developmental process rather than a consequence of differential program effectiveness.
3. Size of project and/or school enrollment is inversely related to achievement gains. This suggests that small projects located in small schools seem more conducive to learning basic skills than large projects located in large schools.
4. Students who scored lower on the pretest tend to make greater achievement gains than their higher scoring counterparts. This, again, is probably due to developmental factors rather than program effectiveness.
5. Per pupil cost is positively related to achievement gains. Undoubtedly, this occurs because per pupil cost is a surrogate for program elements (e.g., more experienced teaching staff, better facilities and materials) which tend to produce high achievement.
6. There is some evidence that absenteeism is inversely related to achievement gains. This finding is generally in congruence with results of recent time-on-task studies.
7. In terms of achievement gain, students who received Chapter 1 instruction in the pull-out setting are likely to perform as well as, if not better than their counterparts in other settings. This suggests that despite its apparent drawbacks (e.g., loss of

regular classroom instruction, transition time) the pull-out setting remains a viable option for providing services to Chapter 1 youngsters.

8. Students who received Chapter 1 instruction under a combination of instructional approaches (e.g., a prescribed system supplemented by miscellaneous materials) are likely to make as much, if not greater, achievement gains as their counterparts under other single approaches. This perhaps points to the validity of allowing the teaching staff flexibility in using materials in ways most suitable for individual students within a project.

During the course of the study, both the state and district compensatory education staff have indicated the importance of teacher variables as contributing factors to project impact. It was pointed out that the regular classroom (intervention) setting had worked well in some schools where Chapter 1 teachers were well trained and where communication between the regular classroom teacher and Chapter 1 staff was effective. Furthermore, low staff turnover was perceived to be a major contributing factor to project impact. These teacher variables are undoubtedly important elements of an effective project and should receive attention in future studies of project impact.

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Table 1

List of Variables Pertaining to Project Profiles

Variable #		
	1	District code
	2	School code
	3	School type
	4	Grade levels covered by school
	5	Project setting
	6	Subject area
	7	Instructional approach
	8	Student grouping
	9	Diagnostic testing
	10	Recordkeeping
	11	Grade levels served by project
	12	Inservice training (Orientation)
	13	Inservice training (Planning/subject area)
	14	Inservice training (Management)
	15	Inservice training (Evaluation)
	16	Project enrollment
	17	Days of project operation
	18	Total hours of instruction
	19	Minutes of instruction per week
	20	Project staff (in FTEs)
	21	School enrollment
	22	Percent of welfare families
	23	School staff (in FTEs)
	24	Number of PAC members
	25	Number of PAC members who were Title I parents
	26	Number of students tested
	27	Pretest NCE
	28	Posttest NCE
	29	NCE gain
	30	Percent of students making positive gains
	31	Number of days absent
	32	Project funding
	33	Per pupil cost

Table 2

Comparison of Project Setting Effects for
Reading Projects of 1978-79 School Year (N=112)

Variable	Regular Classroom	Pull-Out	Combination
No. of Projects	13	53	9
Pre NCE	22.31	16.69	21.18
Per Pupil Cost	433.00	781.07	773.55
NCE Gain	5.91	8.73	7.64
Adjusted NCE Gain*			

*F (2, 70) = .34; no adjusted means were calculated.

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 3

Comparison of Project Setting Effects for
Reading Projects of 1979-80 School Year (N=118)

Variable	Regular Classroom	Pull-Out	Combination
No. of Projects	7	92	10
Pre NCE	20.07	19.49	23.78
Per Pupil Cost	479.86	732.60	595.30
NCE Gain	5.08	8.30	6.18
Adjusted NCE Gain*			

*F (2, 104) = .91; no adjusted means were calculated.

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 4

Comparison of Project Setting Effects for
Reading Projects of 1980-81 School Year (N=119)

Variable	Regular Classroom	Pull-Out	Combination
No. of Projects	31	62	10
Pre NCE	24.34	21.37	23.06
Per Pupil Cost	584.81	625.95	581.90
NCE Gain	6.78	9.73	8.65
Adjusted NCE Gain*			

*F (2, 98) = .85; no adjusted means were calculated.

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 5

Comparison of Project Setting Effects for
Mathematics Projects of 1978-81 School Years
(N = 57)

Variable	Regular Classroom	Pull-Out
No. of Projects	14	12
Pre NCE	15.13	23.39
Per Pupil Cost	420.07	519.00
NCE Gain	8.36	13.33
Adjusted NCE Gain*	9.09	12.47

*Adjusted for pretest and per pupil cost differences. $F\ (1, 22) = 2.43$, $P > .05$

Note: Projects do no sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 6

Comparison of Instructional Approach Effects for Reading Projects of 1978-79 School Year (N=112)

Variable	Instructional Systems	Instructional Materials Only	Combination	Others
No. of Projects	6	3	19	60
Pre NCE	22.4	24.00	18.41	17.73
Per Pupil Cost	532.17	701.66	726.26	723.25
NCE Gain	8.32	4.83	10.39	7.31
Adjusted NCE Gain*	10.86	6.34	10.25	

*Adjusted for pretest and per pupil cost differences. $F(3, 82) = 2.57$, $p > .05$

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 7

Comparison of Instructional Approach Effects for Reading Projects of 1979-80 School Year (N=118)

Variable	Instructional Systems	Instructional Materials Only	Combination	Others
No. of Projects	10	3	61	35
Pre NCE	16.42	25.93	19.11	21.26
Per Pupil Cost	738.60	535.67	709.05	699.14
NCE Gain	6.50	5.53	9.37	6.16
Adjusted NCE Gain*	5.29	8.08	9.15	

*Adjusted for pretest and per pupil cost differences. $F(3, 103) = 3.63$, $p < .05$

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 8

Comparison of Instructional Approach Effects for Reading Projects of 1980-81 School Year (N=118)

Variable	Instructional Systems	Instructional Materials Only	Combination	Others
No. of Projects	7	4	56	17
Pre NCE	18.76	21.67	22.62	23.89
Per Pupil Cost	533.28	682.00	606.18	585.94
NCE Gain	10.07	10.05	9.23	6.25
Adjusted NCE Gain*	9.32	9.22	9.22	6.79

*Adjusted for pretest and per pupil cost differences. $F(3, 78) = 1.03$, $p > .05$

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.

Table 9

Comparison of Instructional Approah Effects for
Mathematics Projects of 1978-81 School Year
(N = 57)

Variable	Combination	Others
No. of Projects	11	13
Pre NCE	23.56	25.19
Per Pupil Cost	447.73	460.61
NCE Gain	10.32	10.56
Adjusted NCE Gain*		

*F (1, 20) = .004; no adjusted means were calculated.

Note: Projects do not sum to total N because of missing data. Projects for which no relevant information was available were excluded from the analysis.